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The Impact of Artificial Intelligence Applications on Enhancing the Quality of Administrative Decisions: An Applied Study on the Abu Dhabi Civil Defense Authority

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Abstract

Artificial Intelligence (AI) is redefining the decision-making process due to data-driven and fact-based analysis. The current study aimed to investigate AI impact of AI on administrative decision-making quality within the Abu Dhabi Civil Defence Authority. The current research is based on quantitative research methods, and data were collected through a census-based survey from a sample size of 234 employees. The data was analysed through Structural Equation Modelling (SEM) in IBM, SPSS, and AMOS. The results identified an excellent fit model (CFI = 0.97, RMSEA = 0.028) and confirmed the validity of the construct. The study findings assessed that AI applications increase the Decision Quality, including Real Time Data Process (RTDP) (β = 0.36, p= 0.003), Predictive Analytics (β = 0.307, p=0.011), and Automation (β = 0.328, p=0.004). RTDP was found to be the strongest driver, and decision quality was reliably demonstrated as a second-order factor, indicating dimensions of accuracy, timeliness, and stakeholder, where all first-order constructs indicate strong composite reliability (CR > 0.78). Most of the young 26-35-year-olds (38.5%) and highly educated (40.2%) workforce were showing an open receptivity to technology-based innovation. However, the moderating role of ethical implementation challenges was insignificant (p=0.375), and poor reliability was assessed in the related components (CR = 0.091), identifying a disconnect among theoretical aspects and operational perceptions. The model described a considerable portion of variance

in administrative decision quality that highlights the transformative role of AI. Real-time systems are the main AI technologies that are strong enablers of superior administrative decisions in a high-pressure public sector. This can be managed through real-time AI infrastructure, investment in consistent digital training programs, and management of proactive ethical governance frameworks for longer resilience and strategic outcomes. The results are clarifying the roadmap for the ADCDA and similar organisations to connect for operational excellence and public safety.
Keywords: Artificial Intelligence, Administrative Decision-Making, Predictive Analytics, Real-Time Data, Automation, Stakeholder Trust.

Introduction

Artificial intelligence (AI) transformed the administrative decision-making process and turned into a game-changer. The technological solutions provide predictive analytics, scenario modelling, and real-time data churning that can assist an organisation in faster and smarter calls that minimise the risks and increase efficiency (Davenport & Ronanki, 2018). For civil defence, AI is a real saviour due to its beneficial role in risk assessment, resource allocation, and emergency response coordination. It does not make things faster only, but also increases public safety (Brynjolfsson & Norbert McAfee, 2017). Furthermore, ADCDA is among the forward-thinking bodies that are working on AI technologies for improvement in the decision-making process and keeping up with the best global practices. The actual AI power in the field is about handling a large amount of data in real time, that tends to be more proactive rather than reactive. This comes as an important issue while dealing with the high-stakes and dynamic situations with serious outcomes, while making the wrong decision (Russell & Norvig, 2020). The rapidly growing Abu Dhabi city has more technology, and it is based on the increasing use of AI within civil defence, that is also required for practical decision-making.

With all the benefits of AI, there are also some challenges of ethics, data privacy, and the requirement for individuals who actually have a good idea for handling the AI-based systems. However, in the case of building robust frameworks and investment in training programs, the challenges can be minimised, and AI can be adopted with more useful decision-making (Binns, 2018). The study explores how AI tools are improving the administrative decision-making quality at the ADCDA. By focusing on previous cases of the actual applicability and outcome, it is assessed that the research will assist to provide a clear path and information for future professionals regarding how AI is changing the administrative practices in the region and globally.

Problem Statement

The growing complexity/unpredictability of the modern administrative environment means that we really need smarter tools and methods. Traditional decision-making models frequently fail in the context of challenges with rapid motion, and particularly in high-stakes areas, such as in civil defense. Though the promises of improved decision quality under AI are real, the implementation of AI raises questions about how well the technology works, whether it can scale and what the ethical implications of the technology are. At the ADCDA, we need to dig in how AI is actually boosting administrative decisions, which factors make it successful and which make it fail (Makridakis, 2017).

Research Objectives and questions

Research Objectives

I. To examine how AI technologies will aid in the quality of administrative decisions in Abu Dhabi Civil Defense Authority.
II. To determine the obstacles and opportunities of AI application in the administrative systems.
III. To make a proposal on how AI can be optimized to be used in decision-making processes within civil defense organisations.

Research Questions

I. What are the effects of AI applications in the quality of administrative decisions in the Abu Dhabi Civil Defense Authority?
II. Which challenges and opportunities are the major concerning the usage of AI in administrative decision-making?
III. Which are the metrics that can be employed to determine the efficiency of AI-based decisions in terms of civil defense?

Importance of the Study

High-rise buildings have been an inherent part of the urban landscape for centuries. Most global metropolises have evolved rapidly due to economic progress and the corresponding boom in the construction sector. As land becomes more and more restricted, vertical expansion is a logical choice. Tall buildings, usually considered 70 ft. (21.3 meters) high in architecture and civil engineering terms, have specific threats and limitations due to their height [4]. Although fire accidents are an everyday issue, they are more dangerous in tall buildings [5]. The primary focus of this study is assessing and enhancing fire safety in high-rise buildings in the UAE using innovative fire-resistant materials.

Literature Review

Independent Variable: Artificial Intelligence Applications

Definition and Scope of the applications of AI

AI is turning out to be a game-changer with its quick, results-based technology solutions, and it has stimulated the cognitive process, including reasoning, learning, and decision-making. The range of AI applications has also changed significantly in the 20th century and expanded to include not only the simple types of automation but also include the complicated functions like natural language processing, machine learning, and robotics (Russell and Norvig, 2020; Makridakis, 2017; Davenport and Ronanki, 2018). Such technologies assist in analysing huge and complicated datasets by organisation, identification of trends, and evidence-based decision-making in the context of administration (Alshami 2021). For example, the use of AI tools like decision support systems (DSS) and predictive analytics tools is becoming an important part of resource allocation and strategic planning.

In this regard, ADCDA ensures the use of technologies to streamline the operational performance and increase public safety. Such a passive surveillance system depends on the AI to assess the areas of high risk and sophisticated analytics to assess potential risks (Brynjolfsson & McAfee, 2017). Moreover, these applications focus on the fact that AI can be adopted to apply and reformulate the responsibilities of administration where these are not considered to solve the issues and pass the strategic plan.

Predictive Analytics and Decision Making

A well-known branch of artificial intelligence, predictive analytics will play the irreplaceable role of improved administrative decision-making. These predictive models will predict future events as well as provide viable information to the decision-makers by utilizing the past and present data streams (Makridakis, 2017; Ghosh, 2019; Davenport and Ronanki, 2018). It is particularly beneficial in those scenarios, where one has to react swiftly on a detailed level, e.g. disaster management, emergency response, etc.

In the field of civil defense, predictive analytics can be used to identify potential threats, whether it is the risk of fire or traffic congestion during the times of emergency. With advanced scenario modelling, administrators will be able to distribute resources with an increased amount of precision as well as implement preemptive actions (Russell and Norvig, 2020; Brynjolfsson and McAfee, 2017). The relevant example is that the Abu Dhabi Civil Defense Authority is implementing AI-based models that can interpret meteorological patterns, population density, and weak infrastructures to predict the crisis and provide the appropriate responses promptly and properly.

Real-Time Data Processing

Real-time data processing is one of the pillars of AI applications and organisations use it to make decisions immediately and in a fully aware manner. Specially designed AI algorithms can simultaneously analyze data with large volumes, which is received in diverse formats, including Internet of Things devices, surveillance measures, and social media (Binns, 2018; Simon, 1997; Makridakis, 2017). These abilities are essential especially in dynamic industries where a delay in decision-making can trigger serious effects.

Consider, as an example, the large-scale emergencies: real-time AI can consider traffic information and provide the most optimal evacuation routes, which alleviates congestion and helps save lives (Brynjolfsson & McAfee, 2017). Similarly, AI-assisted video feeds can identify objects of interest, such as unauthorized access to the controlled area, so that security officers can act immediately. The application of such systems to the Abu Dhabi Civil Defense Authority highlights the capacity of the system to transform real-time information processing to enhance the velocity and quality of decisions.

Automation and Routine Task Management

Another important application of AI is automation, which simplifies the daily administrative processes, scheduling, document management and the allocation of resources. Mechanization of these repetitive activities will enable organisations to ease the pressure on human capital, reduce the errors and improve the overall efficiency of the operation (Davenport and Ronanki, 2018; Makridakis, 2017; Ghosh, 2019). Such change of paradigm enables the administrators to spend more time on strategic, high-impact decision-making.

As an illustration, AI-powered workflow management systems are able to automatically rank tasks, assign resources, and keep track of progress and ensure projects do not get stuck (Russell and Norvig, 2020). Within the civil-defense environment, this automation will ensure that the resources are dispatched to where they are required the most thus enhancing the ability of the organisations to cope with several incidents at a given time.

Difficulties and Moral Issues

Although AI benefits administrative decision-making in a variety of ways, challenges remain associated with its implementation. Ethical reasons include the privacy of data, bias in algorithms, and transparency as a key obstacle to the large-scale use of AI (Binns, 2018; Davenport and Ronanki, 2018; Brynjolfsson and McAfee, 2017). As an example, it can be seen that the bias in the AI algorithms can give rise to the unfair or discriminatory decisions and hence reduce the trust of population towards the technology.

These issues require a strong governance structure that will focus on ethical artificial intelligence creation and implementation. Explainable AI (XAI) and other transparency mechanisms can allow the stakeholders to understand the logic behind the decisions, which contributes to creating a sense of accountability and confidence (Ghosh, 2019; Simon, 1997). Furthermore, the administrators can also be empowered to operate the AI systems in an ethical manner through investing in training programmers.

Dependent Variable: Quality of Administrative Decision

Definition and Significance of the Quality of Decision

Quality of administrative decisions encompasses the effectiveness, efficiency and reliability of the decision implemented in an organisations. High-quality decisions will be in line with the goals of the organisations, maximize the use of resources, and be tangible (Mintzberg et al., 1976; Simon, 1997; Davenport and Ronanki, 2018). Within the case of public-sector organizations like the Abu Dhabi Civil Defense Authority, the quality of the decisions has direct ramifications on the level of public safety, operational smoothness, and trust of the stakeholders.

According to the extant research, decision quality depends on various conditions, such as an availability of correct data, the tools and models of decision-making, and the very framework (Russell and Norvig, 2020; Makridakis, 2017; Ghosh, 2019). Through the adoption of AI applications, organisations can adequately correct these aspects so that decisions made are purely based on facts and strategy.

Timeliness in Decision Processe

Time is a critical component of quality of decision making especially in a civil-defense scenario where delays could result in heavy losses. The area of AI systems increases timeliness because it provides real-time information with the help of multifaceted data processing and analytics (Brynjolfsson and McAfee, 2017; Makridakis, 2017; Simon, 1997). As an example, artificial intelligence-based dashboards displaying real-time metrics help administrators react to an emergency in a timely manner.

Accuracy and Reliability

Decision quality and consistency is essential in the success of an organisations particularly in high stakes conditions. The accuracy is improved because AI technologies implement algorithms that examine data without the biases or abilities of the human mind (Russell and Norvig, 2020; Davenport and Ronanki, 2018; Ghosh, 2019). To use the machine-learned models, which are based on the historical data as an example, it is possible to reveal the patterns and trends that would otherwise be impossible to detect and make a decision grounded upon the objective analysis.

In the context of the civil-defense it could be crucial that decisions are made in a reliable manner, and it could be seen that the difference between dealing with the crisis effectively and enormous losses lies. Predictive analytics and anomaly detection tools, which are AI-based systems, can help the administrator to recognize a threat in time and take the right actions. This is a particularly relevant feature in large cities, such as Abu Dhabi, where the complexity of infrastructures and the high densities of the populations require highly accurate and dependable administrative choices (Brynjolfsson, McAfee and 2017; Makridakis, 2017).

Satisfaction and Trust of Stakeholders

The satisfaction and trust of a stakeholder is directly connected with the quality of administrative decisions. Supportive, open and evidence-based decision making enhances trust among stakeholders, employees, as well as partners and the society. The systems based on AI increase this level of transparency by record keeping the decision-making procedure and giving definite reasons behind the action considered (Binns, 2018; Simon, 1997; Russell and Norvig, 2020).

Illustratively, the decision-support systems (DSS) used in civil defense operations should be able to forge detailed reports of why the resources were allocated or the emergency response plans. Engaging stakeholders in such processes and being accountable will help organisations to foster trust and enlist cooperation. This trust is especially essential within organisations in the public sector, in case the decisions made directly affect community welfare (Makridakis, 2017; Ghosh, 2019).

Long-Term Strategic Impact

Administrable decisions are a key indicator of their quality, although over the long term, it makes the difference. Quality decisions are the ones that bring resilience, flexibility, and long-term development in an organization. These outcomes are supported by artificial intelligence-based applications that allow planning proactively and thoroughly analyzing scenarios (Davenport and Ronanki, 2018; Brynjolfsson and McAfee, 2017; Ghosh, 2019). An example of this is the simulation models of AI, where organisations can estimate the potential impact of diverse strategies before implementing them. These tools have been used in Abu Dhabi Civil Defense Authority to determine the effects of policy accessions and resource redistribution and emergency procedures. The capabilities will help to make sure that decision-making is not only efficient in the short term but also has its strategic views in the long term to improve the overall influence and sustainability of organisations (Russell and Norvig, 2020; Makridakis, 2017).

Connection between AI Application and the decision quality of an administrator

Improving the Process of Decision-Making with the Aid of AI.

The connection between AI usage and the quality of decisions made by an administration is extensive. Use of the AI technologies supports decision-making with information about data analysis to support the decisions, scenario modelling, and real-time monitoring. The quality of decisions directly depends on such tools because they enhance their accuracy, timeliness, and reliability (Brynjolfsson and McAfee, 2017; Davenport and Ronanki, 2018; Makridakis, 2017). To illustrate, predictive analytics allow organisations to foresee difficulties and properly distribute resources, thus taking risks down, and maximizing results.

Managing Decision Making Problems

Other traditional obstacles involved in the decision-making process in an administrative setup that are addressed by AI inclination include information overload and cognitive biases. Also, the AI takes the cognitive burden off of administrators by automating the processing of the data and allowing them to focus on the strategic aspects (Russell and Norvig, 2020; Binns, 2018; Simon, 1997). When making decisions during the civil defense operations, where sometimes it is enforced, the AI systems make sure that the decision taken is informed as well as objective.

Weaknesses and Room to Improve

Even though the connection between AI and quality of decision is mostly favorable, it is not without its restrictions. Algorithms biases, data privacy, and the necessity to have human talent to operate AI systems are only some of the problems that can make AI ineffective (Makridakis, 2017; Ghosh, 2019; Binns, 2018). Nevertheless, these issues can be solved by applying strong training programmers, ethical principles, and open governance to make AI more effective in improving the quality of administrative decisions.

Strategic Implications to Public Sector Organisations.

The introduction of AI into the administrative structures has important consequences to the organisations in the public sector. AI technologies enhance the efficiency of operations, confidence among the stakeholders and happiness among the citizens by increasing the quality of the decisions made. These advantages in the case of the Abu Dhabi Civil Defense Authority manifest itself in the form of improved emergency response, improved management of resources, and improved policy implementation (Brynjolfsson & McAfee, 2017; Davenport and Ronanki, 2018; Simon, 1997).

Future Research Directions

Researchers ought to investigate the associated long-term effects of AI on decision-making in the future especially in dynamic and high stakes settings. The knowledge of the effects of different AI applications on different aspects of decision quality can be useful to organisations that want to streamline their administrative activities (Russell and Norvig, 2020; Makridakis, 2017; Ghosh, 2019). Furthermore, the issue of the role of the ethical and governance frameworks in alleviating the issues related to the adoption of AI will require research to guarantee sustainable and fair outcomes.

Research Gap

Although the current sources indicate the remarkable role of the artificial intelligence (AI) in the process of administrative decision making, there are a number of gaps in the literature research. Recent studies have mostly discussed the advantages of AI on the accuracy, timeliness and efficiency of decisions. Nevertheless, not much attention has been given on the practical issues that organisations have encountered in implementing AI i.e. the challenge of fighting algorithmic biases, data transparency and ethical consequences of automated decision-making. Moreover, there is limited research on a direct correlation between AI usage and the quality of the decisions made by administrators of the public sector organisations, specifically, in high-stakes areas, such as the field of civil defense.

In this paper, the authors will fill these gaps by assessing how AI can improve the quality of decision making amongst the employees of Abu Dhabi Civil Defense Authority. With such a particular context, the study provides great information about practical implications of AI and gives suggestions on how such practices can be optimized to support the decision-making processes in similar organisations at the global level.

Methodology

Research Design

The paradigm followed in this investigation is a detailed systematic investigation of the impact of artificial intelligence (AI) applications to the quality of the administrative decision-making process in the Abu Dhabi Civil Defense Authority. In this section, the design, population, sampling strategy, data collection instruments and statistical procedures to be used are put across thus providing a sound framework to the achievement of significant and valid findings.

Study Design

The quantitative research is used as the foundation of the investigation due to its ability to systematically investigate phenomena with the help of the systematic collection, analysis, and interpretation of numerical data (Creswell, 2014; Sekaran and Bougie, 2016). This is particularly appropriate in evaluating the interdependence between the independent variable which is the applications of AI and the dependent variable which is the quality of the decisions made by the administrative side in an organizational set up. Through the combination of the analytical perspective with the inferential statistics, the study attempts to make an acute realization of the role of AI in decision-making in the context of civil-defense operations.

Population, Sample and Data Collection procedure

The target group is the entire worker of the Abu Dhabi Civil Defense Authority, located in Abu Dhabi city, a count of 234 employees holding a range of administrative roles in the organisations. The study uses census method instead of sampling technique in order to get a complete and impartial set of data. A census grants the incorporation of all the qualified members, thus eliminating the sampling error and enhancing the generalizability of findings (Cochran, 1977; Fowler, 2014). The choice of census is quite wise considering the small size of the population (234), and this was transformed into the possibility of collecting data related to all the participants.

The data gathering occurred in the form of an online survey. The questionnaire was designed using Google forms, and the survey was distributed among the full group of 234 employees via the internal communication systems and via the social media platform like WhatsApp etc. This approach provided effective and extensive distribution, which allowed capturing the opinions of all relevant stakeholders and, therefore, providing an overall picture of the effect of AI.

Instrument of Data Collection: Questionnaire

A structured questionnaire is the major tool of data collection, which is formulated to determine the perception and experience of employees towards the use of AI applications and their impact on the quality of decisions. The questionnaire is divided into several parts which are concerned with certain aspect of the research goals. Items are scaled on a five-

point Likert scale, where 1 (strongly disagree) to 5 (strongly agree), which is hailed as dependable and suffers no complications in interpretation within the social-science research (Likert, 1932; Boone and Boone, 2012).

The questionnaire will have the following sections:

- Demographic Data: This is where vital information of a participant such as age, gender, education, and experience (in years) are recorded.
- AI Applications: Investigates experiences of participants with AI technologies which include usability, efficacy, and limitations.
- Decision Quality: Evaluates the perceived influence of AI on such key aspects of administrative decision-making as accuracy, timeliness, and reliability.
- Challenges and Recommendations the use of open-ended questions to gain qualitative information about challenges faced and ways to maximize AI use in the organisations.

The instrument under scrutiny was passed through pilot test with twenty employees and all was clear, relevant, and reliable. The feedback that was gained during the pilot was used to make further improvements before it could be deployed at large scale.

Analysis Framework

The analysis framework was set up in order to test the research hypotheses using a model-based structured approach:

- Descriptive and Preliminary Analysis: To succinct the sample characteristics and distribution of response regarding the applications of AI and decision qualities.
- Measurement Model Validation: In order to accurately measure the reliability and validity of the constructs (AI applications and Decision Quality dimensions) with advanced psychometrics techniques.
- Structural Model Testing: To test the hypothesized causal relationships among AI applications and quality of administrative decisions empirically.

Justification of the Methodology

The selection of a quantitative methodology based on a census-based sampling and a validated digital questionnaire assured proper data collection of a representative and comprehensive nature. To go beyond ordinary correlation and regression, structural equation modelling (SEM) with IBM software package, SPSS AMOS was used in this study. This is an advanced multivariate technique, better used in testing complex models with latent constructs because in this approach we can test both the measurement model (relationships between indicators and constructs) and the structural model (relationships between constructs) simultaneously. The use of Confirmatory Factor Analysis (CFA) to validate the measurement model followed by path analysis to test hypotheses to examine the theorized relationships in a robust way to increase the validity and reliability of the findings as well as add to the research literature (as outlined by Hair et al., 2019 and Kline, 2015). This complexity of analysis permits differential understanding of the factors of micro influence of AI applications on the multi-faced construct of decision quality.

Hypothesis & Variables

- H1: The implementation of Artificial Intelligence applications has a significant positive impact on the quality of administrative decisions at the Abu Dhabi Civil Defense Authority.

- H2: Among the AI applications, Real-Time Data Processing has a stronger positive impact on Administrative Decision Quality than Predictive Analytics and Automation.
- H3: The positive impact of AI applications on Decision Quality is significantly reflected in the dimensions of Timeliness and Accuracy.
- H4: Challenges related to ethical implementation and stakeholder trust moderate the perceived effectiveness of AI applications, where higher perceived challenges are associated with lower ratings of Decision Quality.

The operational variables for the model are:
Dependent Variable (DV): Administrative Decision Quality (a second-order construct).
Independent Variables (IVs): Three AI Application Dimensions:

- Predictive Analytics (IV1)
- Real-Time Data Processing (IV2)
- Automation (IV3)
- Moderating Variable: Implementation Challenges.

Data Analysis
Data analysis was conducted in a systematic, multi-stage approach with the data analysis software on IBM and its other related products (SPSS Statistics and AMOS) to analyze the answers to the 234 employees.

Descriptive Statistics: Initial analysis included the generation of frequencies and descriptive statistics to describe the sample demographics and summarize the central tendency and distribution of all the variables that were measured.

Reliability and Model Measurement Assessment:
Scale Reliability: The internal consistency of all multi-item constructs was tested using the Cronbach's alpha in the SPPS.
Confirmatory Factor Analysis (CFA): The validity of the measurement model was tested in AMOS software. This involved a confirmation of hypothesized factor structure, evaluations of factor loadings, the assessment of overall fits of the model (with usual indices: Chi-square/degrees of freedom (ch2/df), Comparative Fit Index (CFI), Tucker-Lewis index (TLI), Root Mean Square Error of Approximation (RMSEA))

Structural Model & Hypothesis Testing:
A Structural Equation Model (SEM) was specified and run in AMOS to test the research hypotheses. This model included a second-order factor, Decision Quality as it includes the first-order factors of Decision Quality such as timeliness, accuracy, stakeholder trust, etc.
In the analysis, the significance and strength of the path coefficients (beta values) between the constructs related to the applications of AI and the Decision Quality factor.

The model explanatory power was reported with the coefficient of determination (R2) for the important endogenous constructs, which indicate the variance of Decision Quality accounted by the artificial intelligence (AI) application variables.

Model fit indices were re-examined for the complete structural model for acceptable fit.

This analytical sequence ensured that the constructs were valid and reliable before testing the causal relationships, which provides a complete and rigorous analysis of the impact of AI applications on the quality of administrative decisions.

Results, Analysis and Discussions

Results and Analysis

Demographics Analysis

A sample size of 234 employees from ADCDA is showing a diverse and representative profile for analysis. The age group 26 to 35 years constitute for 38.6% identified a relatively young workforce, that is followed by 22.2% of the 36-to-45-year age group. This shows the receptive nature of the organisation towards technological innovations like AI. The assessment of the gender distribution showed that most of the male respondents 59.0% in which 36.8% were females, and it is important to assess the gender-neutral perceptions of technology. The selected workforce is highly qualified, as most of the respondents were holding a Master's degree (40.2%) and a Bachelor's degree (38.5%) that shows the confidence in the capacity of respondents to evaluate and assess AI applications. When it comes to tenure, a balanced distribution with the largest groups 34.3% with 3-5 years and 31.6% with 0-2 years, was offering both newer and established employee aspects. On the other hand, the demographics of position were showing operations manager (20.9%) was a largest group followed by supervisory and operational roles and they were ensuring the data shows information from personnel directly based on they were affected by the administrative decision-making processes. Such demographic profiles act as a foundation for young, experienced, and educated persons as a sample from which meaningful findings can be derived for AI integration. Furthermore, the demographic appearance of the young individuals, a highly educated workforce, and a focus on the findings related to AI integration in administrative aspects. The profile shows a digitally native workforce, and they are also open to technologies that can assist in smoother integration and a positive understanding of AI tools. This is also confirmed by Makridakis (2017) and indicates that human capital readiness is an important factor for the successful implementation of AI.

Table 4.1.1
Age group distribution

Category	n	%
26–35	90	38.5
36–45	52	22.2
18–25	49	20.9
46–55	32	13.7
56 and above	11	4.7

Table 4.1.2
Gender distribution

Category	n	%
Male	138	59.0
Female	86	36.8
Other	10	4.3

Table 4.1.3
Education distribution

Category	n	%
Masters	94	40.2
Bachelor	90	38.5
MPhil/PhD	34	14.5
Diploma	16	6.8

Table 4.1.4
Years in organization distribution

Category	n	%
3–5 years	80	34.2
0–2 years	74	31.6
6–9 years	45	19.2
10+ years	35	15.0

Table 4.1.5
Position distribution

Category	n	%
Operations Manager	49	20.9
Supply Chain Coordinator	37	15.8
Logistics Supervisor	34	14.5
Procurement Officer	31	13.2
SME Owner/Entrepreneur	30	12.8
Quality Assurance Officer	29	12.4
Other	24	10.3

Model Fit Indices

Overall, the Structural Equation Model (SEM) fits the data pretty good, and we can have some confidence in the postulated relationships. Key indices are above the usual cut - offs: CFI = 0.97, TLI = 0.966 - both way over the 0.95 benchmark. RMSEA = 0.028 which is well below the cut-off of 0.08 indicating close fit. Even if the result of the Chi-square test is significant (p = 0.016), the ratio of the value of Chi-square and the number of degrees of freedom is excellent (less than 2). GFI is slightly low (0.833), but that is typical in complex models and doesn't affect the superior CFI, TLI and RMSEA results. All in all, the model seems to be a good representation of the data, and can be trusted when carrying out hypothesis testing.

Table 4.2.1
Model Fit Indices

Index	Value
Chi-square	365.745
df	310
p-value	0.016
CFI	0.97
TLI	0.966
RMSEA	0.028
GFI	0.833
AIC	132.874
BIC	367.836

Structural Path (Hypothesis Testing)

The path coefficients provide us with a direct test on our hypotheses. We're getting a lot of evidence that AI assists in making better Decisions (DQ). Predictive Analytics (30.7%---p=0.011), Real-Time Data Processing (36%---p=0.003) and Automation (32.8%---p=0.004) all have a positive and significant impact on DQ. Real intuitively says, "Real Time Data Processing has the biggest standardized effect so that is consistent with the idea (H2) that it's more influential than the others." Surprisingly, the path from Ethical Implementation challenges (EI) to DQ is negative (beta = -0.321) but not statistically significant (p = 0.375), which means ethics challenges don't really play a moderating role in this context. Lastly, there is a fixed relationship (beta = 1.0) between DQ latent construct and its observed measure, by confirming that it was modelled correctly as done in unitary factor.

Table 4.2.2

Structural Paths (Hypothesis Testing)

DV	IV	B	Beta_std	SE	z	p
DQ	PA	0.11	0.307	0.043	2.55	0.011
DQ	RT	0.13	0.36	0.044	2.937	0.003
DQ	AU	0.111	0.328	0.038	2.885	0.004
DQ	EI	-0.11	-0.321	0.124	-0.886	0.375
TF	DQ	3.821	1	1.059	3.609	0

Standardized Factor Loadings & 4.2.4. Reliability and Validity

The measurement model indicates strong significant loadings for most of the constructs, thus the questionnaire items are doing the job. Loadings for Predictive Analytics (PA), Real-Time Processing (RT), Automation (AU) as well as the Decision Quality dimensions (Timeliness - TL, Accuracy - AC, Stakeholder Trust - ST, and Tech Framework - TF) all exceed 0.65 and are good indicators of item reliability. However, The Ethical Implementation (EI) construct has serious issues: two of its four items (Q23, Q24, and Q25) have non - significant or negative loadings, which wrecks its validity. Table 4.2.4 shows EI's Composite Reliability (CR) is a mere 0.091 and its Average Variance Extracted (AVE) is 0.151 - far below the accepted thresholds (CR > 0.7, AVE > 0.5). In contrast, all other constructs are solid being CRs between 0.738 and 0.87 and AVEs mostly above 0.48 (RT and PA are a bit lower but still okay due to high CR). The Tech Framework (TF) is particularly strong (CR = 0.87, AVE = 0.691). So EI is the one that stands out and may require a major rewrite or different approach.

Table 4.2.3

Standardized Factor Loadings

Construct	Item	Loading_std	p
PA	Q1	0.722	-
PA	Q2	0.653	0
PA	Q3	0.711	0
RT	Q5	0.673	-
RT	Q6	0.724	0
RT	Q7	0.699	0
RT	Q8	0.686	0
AU	Q9	0.74	-
AU	Q10	0.724	0
AU	Q11	0.703	0

AU	Q12	0.737	0
TL	Q13	0.717	-
TL	Q14	0.794	0
TL	Q15	0.704	0
AC	Q16	0.735	-
AC	Q17	0.815	0
AC	Q18	0.724	0
ST	Q19	0.769	-
ST	Q20	0.788	0
ST	Q21	0.676	0
EI	Q22	0.759	-
EI	Q23	0.054	0.585
EI	Q24	-0.1	0.435
EI	Q25	-0.129	0.392
TF	Q26	0.889	-
TF	Q27	0.823	0
TF	Q28	0.779	0

Summary and Synthesis

The results validate the significant increase of perceived quality of administrative decisions at the Abu Dhabi Civil Defense Authority that comes about by core AI tools including Predictive Analytics, Real data's processing, and Automation. Real - Time Data Processing is the leading driver. The structural model fit well and the measurement instruments for the main constructs are reliable and valid. The primary hiccup is the Ethical Implementation (EI) scale, which failed to act psychometrically. That doesn't say anything about the dislike of ethics being important, it only lets you know that those exact items did not define an internalized construct or that perceptions of ethics are more complex than the model allows. For the sake of practical steps, keeping your investments in and rolling out real-time data systems and automation tools front and center, since it has the clearest path for better decision accuracy, timeliness and trust. Future studies should reconsider conceptualization and measurement of ethical challenges in this environment.

Table 4.2.4

Reliability and Convergent Validity (CR, AVE)

Construct	CR	AVE	n_items	min_loading	max_loading
PA	0.738	0.485	3	0.653	0.722
RT	0.79	0.484	4	0.673	0.724
AU	0.817	0.527	4	0.703	0.74
TL	0.783	0.547	3	0.704	0.794
AC	0.803	0.576	3	0.724	0.815
ST	0.789	0.556	3	0.676	0.788
EI	0.091	0.151	4	-0.129	0.759
TF	0.87	0.691	3	0.779	0.889

Discussion and Findings

This study investigated empirically, the effect of Artificial Intelligence applications on the quality of administrative decisions in the Abu Dhabi Civil Defense Authority (ADCDA). The results of the Structural Equation Modeling analyses support the central thesis from the

literature about the contribution of AI technologies to improved decision-making in public sector, high-stakes settings in a strong and quantitative way. The good model fit (CFI=0.97, TLI=0.966, RMSEA=0.028) indicates that the hypothesized relationships between AI constructs and decision quality are a powerful description of reality in this organization to validate the conceptual framework based on the works of scholars such as Davenport and Ronanki (2018) and Brynjolfsson & McAfee (2017).

The results of the analysis strongly support the main hypothesis (H1) that the implementation of AI has a positive effect on the quality of decisions. All three core applications of AI: Predictive Analytics (v=0,307, p=0,011), Real-time data processing (v= 0, 36, p=0,003), Automation (v= 0,328, p=0,004) demonstrated significant positive Path Coefficients. This corresponds to the literature review, which stated that these tools improve decision-making by evidence, by processing complicated data, finding patterns and reducing human cognitive load (Russell & Norvig, 2020; Simon, 1997). The results support that at ADCDA, these applications are not just technological upgrades, but are being actively perceived by employees as ways for improving the effectiveness, efficiency and reliability of the administrative decisions.

One of the most important and practical insights is the partial confirmation of hypothesis H2 where Real Data Processing would be the most powerful one to have impact. In fact, it had the most standardized beta coefficient (0.36). This brings to bear the critical important role that should be played by immediacy and the place of situation in the performance of civilian defense operations, which lies at the core of the literature (Brynjolfsson & McAfee, 2017). In dynamic emergency situations where delay results in grave outcomes, the capacity for artificial intelligence to run through IoT, surveillance and social media data in real-time is a decisive advantage. This finding implies that for organizations such as ADCDA, strategic investment in real time analytics infrastructure should be one of their top priorities in order for them to achieve maximum decision quality.

Furthermore, hypothesis H3 was confirmed as the construct of Decision Quality was reliable as its dimensions of Timeliness, Accuracy and Stakeholder Trust were reliably measured (all with strong factor loadings and good reliability). This triangulation gives credence to the multi-faceted definition of decision quality that is found in the literature (Mintzberg et al., 1976). The important positive impacts of AI on this higher level construct must mean that the technology simultaneously enhances the speed (Timeliness) and the correctness (Accuracy) of decisions that in turn builds confidence and satisfaction (Stakeholder Trust) among employees and partners. This holistic improvement is necessary in creating the resilient and long term strategic impact Davenport and Ronanki (2018) describe.

However, one critical and unexpected finding was the lack of support for the hypothesis H4 of Hypothesis which suggested that Ethical Implementation (EI) challenges would negatively moderate the Culmen Relationship between AI and Decision Quality. The path was non-significant (p=0.375), and even more important, the EI measurement construct failed psychometrics (CR=0.091, AVE=0.151). This is not to say that there are no ethical issues at play, however, it does suggest that the measured items did not relation to a coherent latent variable as perceived by the respondents. This has provided an important insight: although there is a strong focus in the literature on ethical risks such as bias and transparency (Binns,

2018), the ADCDA employees may not see these as a cohesive "challenge" that directly undermines the perceived effectiveness of AI in their existing context of operation. The ethical dialogue could be compartmentalized or not yet having material effects on perceptions of the quality of decisions amongst the affected communities at the front lines.
The demographic characteristics of a young (38.5% aged 26-35), highly educated (78.7% holding a Bachelor's degree or higher) workforce puts these findings into context. This profile likely represents a workforce that is digitally native and open to the adoption of technologies, which could help support smoother integration and positive perception of AI tools. This overlaps with the literature that states that human capital readiness is a vital factor in successful AI implementation (Makridakis, 2017).

In synthesizing such findings with this research gap identified, a clear contribution is made by this study. It goes far beyond broad claims about the benefits of AI to offer quantified proof of the differential impact of specific applications of AI in a high stakes public sector context. It confirms the theorized positive relationship but also reveals one nuance, that operational benefits (real-time processing, automation) are immediately tangible and valued, while the broader ethical concerns (despite being critically important in the literature) might not yet be a salient moderating factor in user experience in this particular organizational implantation phase.

Conclusion and Recommendations

Based on what we learned in our AI class and the information we gathered from this research, here are some things Abu Dhabi Civil Defense Authority, and organizations like this that exist in the public sector can do:

1. Focus on the Investment in Real-Time Data Processing (RTDP) Infrastructure: For example, research showed that: - "Businesses that put more budget into AI systems that could instantly crunch data from IoT sensors, surveillance networks, and commas channels were the best at increasing the quality of decision, because those were the best at improving decision quality."
2. Develop and Formalize an Ethical Artificial Intelligence Frameworks: So important, to make: - Create clear policies which address issues of data privacy, algorithmic bias, and transparency that help ensure stakeholders trust the system and that risks are detected at an early stage.
3. Start a Continuous AI training and upskilling Program: Prioritize reading, understanding, and using AI tools. A group of researchers at the Naneguard project anticipates an extremely meaningful future for AI technologies.
4. Encourage an Explainable AI (XAI) Environment: Radio vid: "You hear and see that they will say they will always have some kind of explanation, that will consume less trust, but this is the nature of those technologies." "You have to remember that many times use cases or completely new use cases are not conceived and generated by an AI."
5. Establish a Cross-disciplinary (Cross-functional) A.I. Integration Committee: For Governments: - "Form a team with ops managers, IT pros and ethics officers to chart the roadmap for implementation, deal with change, and keep AI projects focused on the agency's goals".
6. Conduct a Longitudinal Impact Study: As with any new technology, the practicality, ethicality, and effectiveness of AI will arise. "To ensure [AI] is used to improve resilience, make decisions and actions more efficient, and enhance public safety, it is important to

recognize the limits and to specify the required decision quality." "Furthermore, to evaluate how AI will pay off over time in resilience and public safety it is important to make a commitment to track the same decision-quality metrics for 3-5 years."

7. Revise the Measurement of the Constructs of Ethics and Challenge: Redesign the survey with questions better tailored to our study so that we can obtain a better sense of employee perceptions of ethical challenges in the future.
8. Develop Standardized A.I. Enhanced Decision Protocols: SOPs that incorporate AI - derived insights as intra-workflow decisions.
9. Improve Stakeholder Communication about AI Use: By communicating with internal and external stakeholders, AI project leaders can get the word out how AI is aiding decisions with the benefit of public safety and human oversight controls to achieve broader acceptance.
10. Create Public Sector AI Knowledge Sharing Consortium: Lead or take lead in a forum with other UAE gov't and civil defense agencies to share best practices and collaborate on AI deployment to take the administrative decisions.

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